

REMARKS

Claims 1, 3-9 and 11-20 are currently pending in the application. Claims 1 and 4 are independent.

A. Introduction

In the outstanding Office Action Made Final,

- 1) claims 1, 4, 6-8, 17 and 20 were rejected under 35 U.S.C. § 102(b) as being anticipated by “A Thermal Bubble Actuated Micro Nozzle-Diffuser Pump,” *The 14th IEEE International Conference on Micro Electro Mechanical Systems*, Interlaken, Switzerland, Jan. 21-25, 2001, to Tsai et al. (“the Tsai et al. reference”);
- 2) claims 1, 6-9, 11-16 and 18 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,387,314 to Baughman et al. (“the Baughman et al. reference”);
- 3) claims 3 and 5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Tsai et al. reference;
- 4) claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Baughman et al. reference;
- 5) claim 16 was rejected under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over, the Baughman et al. reference as applied to claim 15, and further evidenced by U.S. Patent No. 6,428,875 to Takahashi et al. (“the Takahashi et al. reference”);
- 6) claim 17 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Baughman et al. reference; and
- 7) claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Baughman et al. reference as applied to claim 13.

B. Asserted Anticipation Rejection of Claims 1, 4, 6-8, 17 and 20

In the outstanding Office Action Made Final, claims 1, 4, 6-8, 17 and 20 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Tsai et al. reference. This rejection is respectfully traversed for at least the reasons set forth below.

1. Claim 1

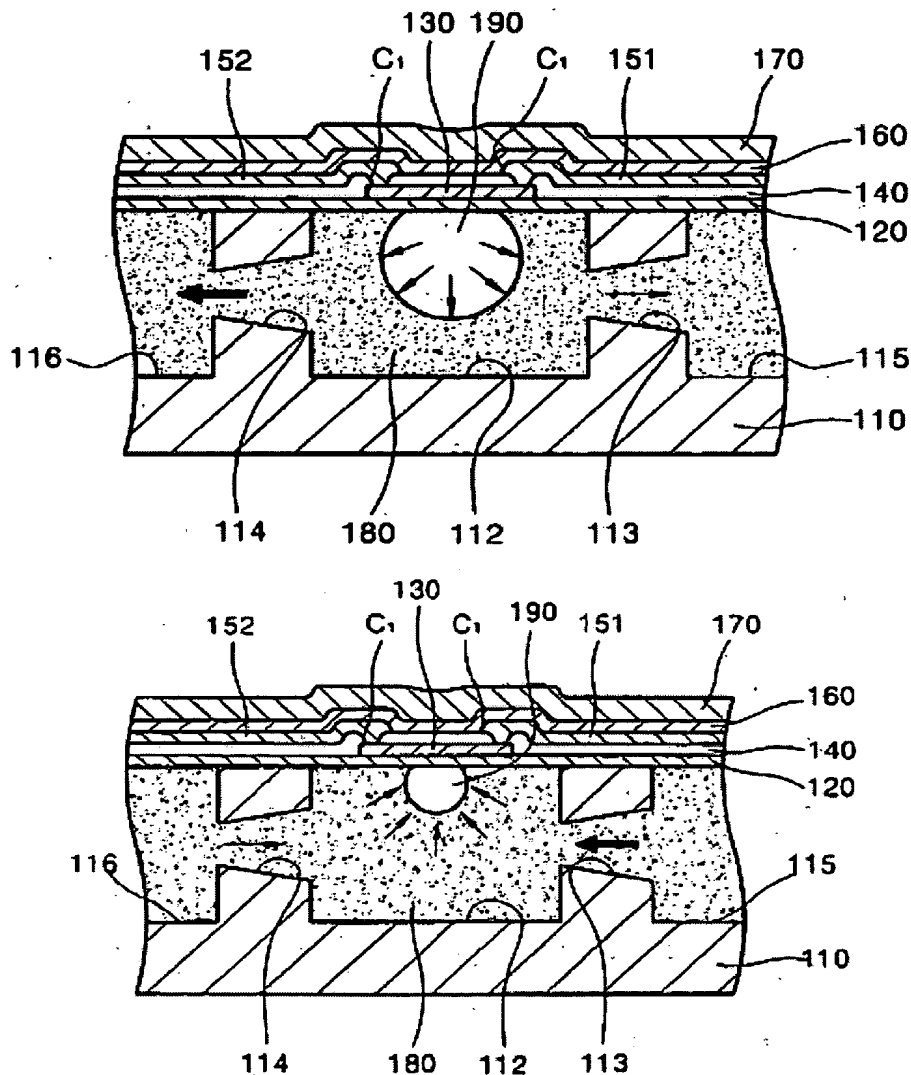
Claim 1 recites, *inter alia*, “wherein the cross-sectional area of the fluid entrance decreases in a direction toward the pumping chamber, and the cross-sectional area of the fluid exit increases in a direction toward the pumping chamber” (emphasis added). The Office

Action Made Final asserted that the Tsai et al. reference discloses this subject matter.

Applicants respectfully disagree, and respectfully submit that the Tsai et al. reference discloses just the opposite. In this regard, applicants respectfully submit that the rejection of claim 1 is improper because the rejection relies on an interpretation of claim 1 that is inconsistent with the rejection of claim 4, and is inconsistent with applicants' disclosure.

The operation of an example micro-pump structure in accordance with claim 1 is illustrated in FIGS. 5A and 5B of the application (reproduced below).

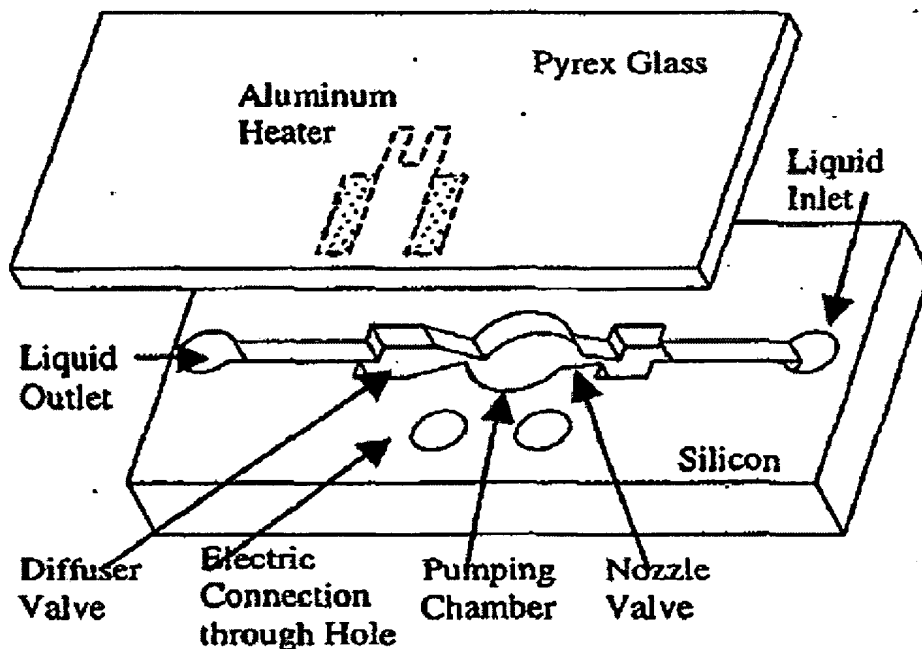
FIGS. 5A (top) and 5B (bottom)



FIGS. 5A and 5B of the application illustrate micro-pump discharge and filling stages, respectively. In particular, FIG. 5A illustrates a stage in which an expanding bubble 190 forces a fluid to be discharged from the micro-pump chamber 112 through the micro-pump exit 114, and FIG. 5B illustrates a stage in which a collapsing bubble causes the fluid to flow through the entrance 113 into the chamber 112. As recited in claim 1, the cross-sectional area of the fluid entrance 113 decreases in a direction toward the pumping chamber 112, and the cross-sectional area of the fluid exit 114 increases in a direction toward the pumping chamber.

In contrast, the Tsai et al. reference describes a micro-pump having just the opposite structure, as illustrated in FIG. 2 of the reference (reproduced below).

The Tsai et al. reference, FIG. 2



The Tsai et al. reference clearly identifies the micro-pump inlet and outlet. Further, it can be seen in FIG. 2 that the inlet (nozzle valve) increases in size in the direction toward the pumping chamber, whereas claim 1 recites that the size decreases. Moreover, it can be seen in FIG. 2 that the outlet (diffuser valve) decreases in size in the direction toward the pumping

chamber, whereas claim 1 recites that the size increases. Accordingly, applicants respectfully submit that the Tsai et al. reference fails to disclose, or even suggest, each and every element of claim 1.

a. The rejection is improper because claim 1 has been interpreted differently from claim 4

In the rejection of claim 4, the Office Action Made Final asserts that the “fluid entrance” recited in claim 4 reads on the “liquid inlet” described in the Tsai et al. reference, and asserts that the “fluid exit” recited in claim 4 reads on the “liquid outlet” described in the Tsai et al. reference.¹ However, the rejection of claim 1 employs the opposite interpretation of the same claim terms, asserting that the “fluid entrance” recited in claim 1 reads on the liquid outlet of the Tsai reference, and asserting that the “fluid exit” recited in claim 1 reads on the liquid inlet of the Tsai reference. Applicants respectfully submit that such inconsistent claim interpretation is improper.

It is well-settled law that the Examiner should use the broadest reasonable interpretation of the claims, consistent with the specification, during examination. Nonetheless, terms must be consistently interpreted throughout the claims and the specification. Accordingly, it is not reasonable to give claim terms recited in claim 1 the opposite interpretation of the same terms used in claim 4.

The Federal Circuit clearly enunciated the requirement for consistent interpretation of claim terms during examination in *In re Cortright*, where the court reversed the Board of Patent Appeals and Interferences for failure to employ a consistent interpretation of the claim term “restore hair growth.”² In particular, the court clearly described the fatal defect in the Board’s reasoning as arising from an interpretation of the claim term that “is inconsistent

¹ Office Action Made Final mailed May 7, 2008, page 4.

² *In re Cortright*, 165 F.3d 1353 (Fed. Cir. 1999).

with its previous definitions.” The Office Action Made Final likewise relies upon interpretations of claim terms in claim 1 that is inconsistent with the interpretations of those same terms in claim 4, which is clearly improper.

b. The rejection is improper because claim 1 has been interpreted in a manner inconsistent with applicants’ disclosure

As noted above, it is well-settled law that claim terms must be given their broadest reasonable interpretation, consistent with the specification, during examination. The rejection of claim 1 is fatally defective in this regard. Applicants’ specification uniformly describes the micro-pump as moving fluid from the fluid entrance to the fluid exit.³ Accordingly, applicants respectfully submit that it is unreasonable to interpret the claim terms in claim 1 in a manner that is contrary to the specification.

The Office Action Made Final attempts to justify the inconsistent interpretation of the claim terms in claim 1 by asserting “the Liquid Inlet and Liquid Outlet [to] each function as an entrance and an exit. Each component inherently accomplishes both functions at different times during operation,” relying on a discussion of inherent backflow in the prior art.⁴ Applicants respectfully submit, however, that the interpretation of the claim terms “fluid entrance” and “fluid exit” does not alternate according to the operation of the micro-pump. Rather, the interpretation of the terms is fixed by their use in the disclosure, as understood by one of ordinary skill in the art. In this regard, it is noteworthy that applicants’ specification also describes backflow, but nonetheless uniformly describes the net fluid flow as being from the pump entrance to the pump exit.⁵ Moreover, one of ordinary skill in the art would

³ See, e.g., paragraph [0058] of the published application, U.S. Patent Application Publication No. 2004/0146409 A1, which states, “a net flow rate in a direction from the fluid entrance 113 to the pumping chamber 112 to the fluid exit 114 can be generated”

⁴ Office Action Made Final mailed May 7, 2008, page 5.

⁵ Backflow is illustrated by small arrows in FIGS. 5A and 5B of the application, and is describe in, e.g., paragraph [0058], which states, “when the bubble 190 expands, the amount of fluid 180 discharged from the

consistently interpret the terms “fluid entrance” and “fluid exit” in terms of net fluid flow, i.e., regardless of backflow, as clearly evidenced by the Tsai et al. reference itself.⁶

2. Claim 4

Claim 4 recites, *inter alia*, “each of the pumping chamber and the heating element has a circular shape” (emphasis added). The Office Action Made Final asserted that the Tsai et al. reference discloses this subject matter. Applicants respectfully disagree, and respectfully submit that the rejection of claim 4 is improper because the rejection relies on an interpretation of the term “circular” in claim 4 that is inconsistently applied to the “pumping chamber” and “heating element” features, and is inconsistent with the understanding of one of ordinary skill in the art.

a. The rejection is improper because the term “circular” has been interpreted differently for different claim elements

The Office Action Made Final asserts that the “circular shape” pumping chamber recited in claim 4 reads on the circular pumping chamber shown in FIG. 2 of the Tsai et al. reference, yet inconsistently asserts that the “circular shape” heating element recited in claim 4 reads on the meander-shaped, i.e., serpentine, heater that is also shown in FIG. 2. Applicants respectfully submit that such an inconsistent interpretation of the term “circular shape” in claim 4 is clearly improper under *In re Cortright*.

b. The rejection is improper because claim 4 has been interpreted in a manner inconsistent with the understanding of one of ordinary skill in the art

Further to the above, applicants respectfully submit that one of ordinary skill in the art would not interpret the meander-shaped heater of the Tsai et al. reference as having “circular

pumping chamber 112 through the fluid exit 114 is much larger than the amount of fluid 180 discharged from the pumping chamber 112 through the fluid entrance 113.”

⁶ See the Tsai et al. reference at page 409, which states, “a net flow is generated from nozzle [inlet] to diffuser [outlet] for each cycle.”

shape,” as recited in claim 1, particularly when read in view of applicants’ disclosure, which describes cases wherein the circular shape is implemented in a “hemisphere” or “cylinder.”⁷

In view of the above, applicants respectfully submit that the claim term “fluid entrance” recited in claim 1, when properly interpreted, does not read on the liquid outlet of the Tsai et al. reference. Further, the claim term “fluid exit” recited in claim 1, when properly interpreted, does not read on the liquid inlet of the Tsai et al. reference.

Accordingly, claim 1 is allowable over the Tsai et al. reference. Additionally, applicants respectfully submit that the heating element having a “circular shape,” as recited in claim 4, does not read on the meander-shaped heater of the Tsai et al. reference. Accordingly, claim 4 is also allowable over the Tsai et al. reference. Claims 6-8, 17 and 20 depend from claim 1, and are allowable for at least the reasons that claim 1 is allowable. Therefore, applicants respectfully request that this rejection be favorably reconsidered and withdrawn.

C. Asserted Anticipation Rejection of Claims 1, 6-9, 11-16 and 18

In the outstanding Office, claims 1, 6-9, 11-16 and 18 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Baughman et al. reference. This rejection is respectfully traversed for at least the reasons set forth below.

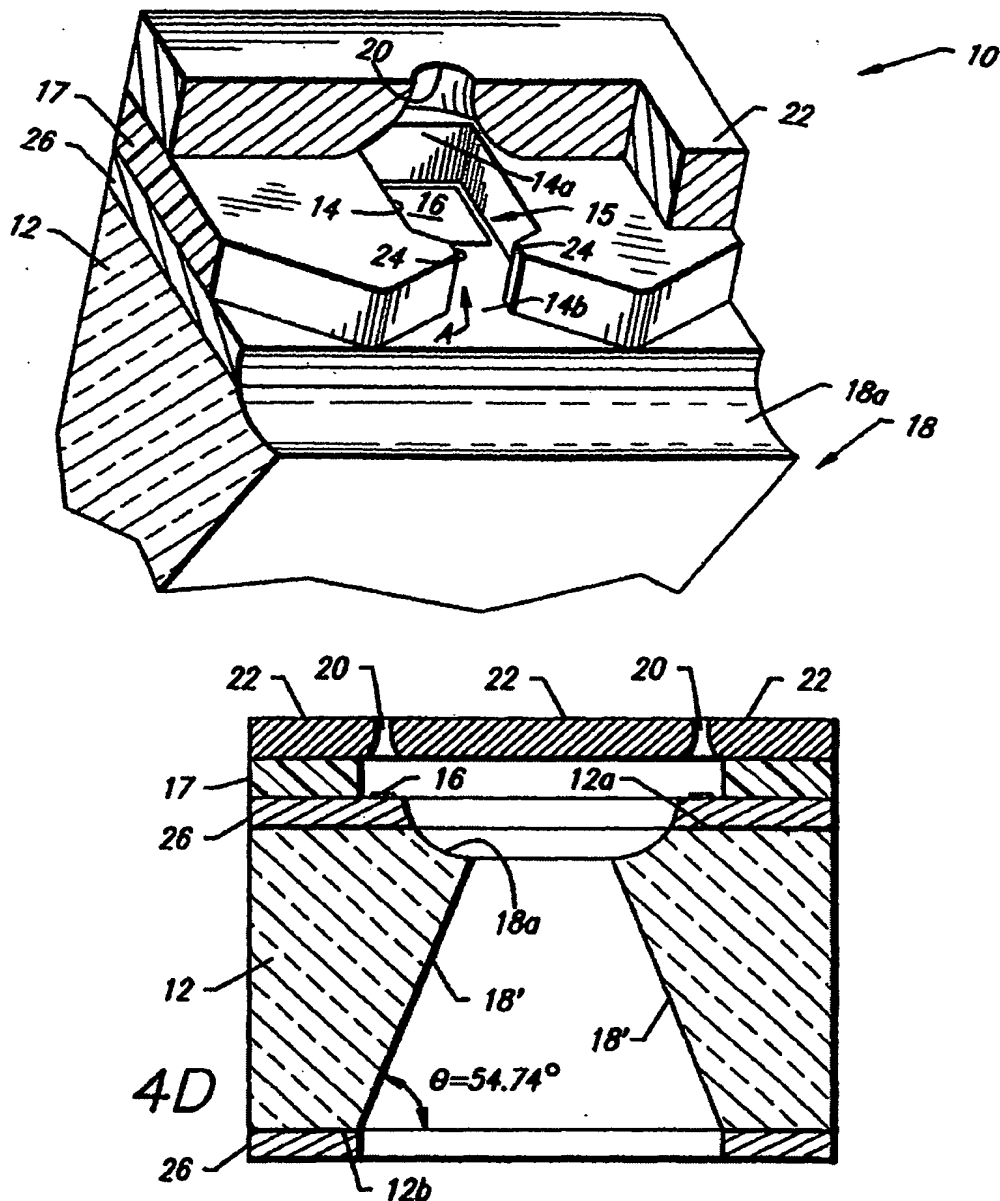
Claim 1 recites, *inter alia*, “a cross-sectional area of . . . the fluid exit varies along a direction of the fluid flow to have a constant inclination angle along its entire length” (emphasis added). The Office Action Made Final asserted that the Baughman et al. reference discloses this subject matter. In particular, the Office Action Made Final asserted that the above-identified portion of claim 1 reads on a nozzle 20 described in the Baughman et al. reference.⁸ Applicants respectfully disagree.

⁷ See, e.g., paragraph [0061] of the application.

⁸ Office Action Made Final mailed May 7, 2008, page 5.

The Baughman et al. reference describes a printhead having a nozzle 20 formed in a cover plate 16. The nozzle 20 is clearly shown as having sidewalls that are circular in a plane parallel to the face of the nozzle plate 22, and which curve in planes normal to the face of the nozzle plate 22, as illustrated in FIGS. 1 and 4D of the reference (reproduced below).

The Baughman et al. reference, FIG. 1 (top) and FIG. 4D (bottom)



The Baughman et al. reference clearly shows the nozzle 20 has having an inclination angle that is not constant along its entire length, but instead varies so that there is no constant

angle along the entire length. Accordingly, applicants respectfully submit that the claim element “a cross-sectional area of . . . the fluid exit varies along a direction of the fluid flow to have a constant inclination angle along its entire length . . .” is not disclosed, or even suggested, by the Baughman et al. reference.

In view of the above, applicants respectfully submit that claim 1, as well as claims 6-9, 11-16 and 18 depending therefrom, are allowable over the Baughman et al. reference. Therefore, applicants respectfully request that this rejection be favorably reconsidered and withdrawn.

D. Asserted Obviousness Rejection of Claims 3 and 5

In the outstanding Office Action Made Final, claims 3 and 5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Tsai et al. reference. This rejection is respectfully traversed for at least the reasons set forth below.

Claims 3 and 5 depend from claims 1 and 4, respectively. Claims 3 and 5 are allowable for at least the reasons their respective base claims are allowable. Therefore, applicants respectfully request that this rejection be favorably reconsidered and withdrawn.

E. Asserted Obviousness Rejection of Claim 3

In the outstanding Office Action Made Final, claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Baughman et al. reference. This rejection is respectfully traversed for at least the reasons set forth below.

Claim 3 depends from claim 1, and is allowable for at least the reasons claim 1 is allowable. Therefore, applicants respectfully request that this rejection be favorably reconsidered and withdrawn.

F. Asserted Rejections of Claim 16

In the outstanding Office Action Made Final, claim 16 was rejected under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as being

unpatentable over the Baughman et al. and Takahashi et al. references as applied to claim 15.

This rejection is respectfully traversed for at least the reasons set forth below.

Claim 16 ultimately depends from claim 1, which is allowable over the Baughman et al. reference for at least the reasons set forth above in section C. The Takahashi et al. reference fails to cure the deficiencies in the Baughman et al. reference. Accordingly, claim 16 is allowable for at least the reasons claim 1 is allowable. Therefore, applicants respectfully request that this rejection be favorably reconsidered and withdrawn.

G. Asserted Obviousness Rejections of Claim 17

In the outstanding Office Action Made Final, claim 17 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Baughman et al. reference. This rejection is respectfully traversed for at least the reasons set forth below.

Claim 17 depends from claim 1, and is allowable for at least the reasons claim 1 is allowable. Therefore, applicants respectfully request that this rejection be favorably reconsidered and withdrawn.

H. Asserted Obviousness Rejection of Claim 19

In the outstanding Office Action Made Final, claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Baughman et al. reference as applied to claim 13. This rejection is respectfully traversed for at least the reasons set forth below.

Claim 19 ultimately depends from claim 1, and is allowable for at least the reasons claim 1 is allowable. Therefore, applicants respectfully request that this rejection be favorably reconsidered and withdrawn.

I. Withdrawal of Finality Requested

Applicants respectfully request withdrawal of the finality of the Office action. The previous amendment merely incorporated the subject matter of dependent claim 2 into the claim 1, and re-wrote claim 4 in independent form with the incorporation of claim 10 therein.

Accordingly, the subject matter recited in claims 1 and 4 was already under examination, and the new grounds of rejection were not necessitated by amendment.

J. Conclusion

The above remarks demonstrate the failings of the outstanding rejections, and are sufficient to overcome the rejections. These remarks, however, are not intended to, nor need they, comprehensively address each and every reason for the patentability of the claimed subject matter over the applied art. Accordingly, applicants respectfully submit that the claims are allowable for reasons including, but not limited to, those set forth above, and patentability of the claims does not depend solely on the particular claim element(s) discussed above.


If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

In view of the foregoing, reconsideration of this application is earnestly solicited, and an early and favorable further action upon all the claims is hereby requested.

Respectfully submitted,

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PETITION and
DEPOSIT ACCOUNT CHARGE AUTHORIZATION

This document and any concurrently filed papers are believed to be timely. Should any extension of the term be required, applicant hereby petitions the Director for such extension and requests that any applicable petition fee be charged to Deposit Account No. 50-1645.

If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.